1977

Longevity of doublegee seed under continuous pasture

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EXPERIMENT SUMMARY 1977

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LONGEVITY OF DOUBLEGEE SEED

UNDER CONTINUOUS PASTURE

Locality

Avondale, Wongan Hills and Chapman Research Stations.

Background

Since 1974 pegged areas on the three research stations have been under continuous pasture and have been sampled annually to study the fate of the viable doublegee seed population.

Each site was sprayed for doublegee control in the growing season before the first samples were taken in late summer of 73/74. The sites were again sprayed in the 1974 growing season except for Wongan Hills. The Wongan Hills site was cropped in 1976 and no further data is available.

RESULTS	VIABLE SEEDS/M^2			
	1974	1975	1976	1977
Avondale	2386	68	0	22
Wongan Hills	1045	1299	1569	N.A.
Chapman	1424	N.A.	346	190

Comments

Viable doublegee seeds have declined under continuous pasture at Avondale and Chapman where the sites were sprayed in two successive years immediately after cropping. No control measures were applied at Wongan Hills during this time.

The 1977 result at Avondale represents one viable seed that was recovered in the 30 samples taken. Buried doublegee seeds appear to lose viability rapidly at Avondale, i.e. 2 years.

DOUBLEGEE SEED LONGEVITY X CULTIVATION

74C7

Locality

Chapman Research Station

Soil Type

Objective

To compare the effect of cultivation and spraying on doublegee seed longevity.

Time started

March 1974 on area cropped in 1973.

Results

March 1974 soil sampled.
March 1975 soil sampled.
January 1976 soil sampled.
November 1976 soil sampled.
January 1978 soil sampled.

TREATMENT	1974	1975	1976	1977
	LIVE SEED /M^2	LIVE SEED /M^2	LIVE SEED /M^2	LIVE SEED /M^2
Continuous crop	70.2	51	22	0
Continuous pasture	70.2	200	230	219
Continuous pasture & spray	70.2	66	88	51

Comment

By 1977 the first treatment had been cropped four years in succession and no viable doublegee seed was recovered from the soil. Although spraying pasture has not reduced the live doublegee seed population it has prevented the rapid increase in live seed that occurs on unsprayed pasture during the first year after a crop.

DOUBLEGEE SEED LONGEVITY X DEPTH

75WH66

Locality

Wongan Hills Research Station

Soil Type

Wongan loamy sand

Source of Seed

Chapman 1974

Trial Started

5.6.75 Doublegee achenes enclosed in gauze were buried at 12, 25, 50 and 100 mm.

Results

Germination test on seed used. Germination test on samples, recovered on 4.3.76. and 13.12.76.

LENGTH OF TIME BURIED (MONTHS)	DEPTH OF BURIAL MM	NO. OF SEEDS RECOVERED	% LIVE SEED	% DEAD/ EMPTY SEED
NIL (STORED IN LABORATORY)			85	15
9 MONTHS (ONE WINTER & ONE SUMMER)	12 25 50 100	200 200 200 200	14 9.5 12.5 13	86 91 87.5 87
		MEAN	12.125	87.875
18 MONTHS (SEED RECOVERED AT END OF 2ND GROWING SEASON	12 25 50 100	197 200 200 200	12 5.5 4.5 9.5	86.5 94.5 95.5 90.5
		MEAN	7.875	91.75

Comment

Only 12% seed has survived after being buried for 9 months. This trial will be sampled annually until no further seed is surviving or for another 8 years whichever comes first.

DOUBLEGEE SEED LONGEVITY X CULTIVATION

75WH65

Locality

Wongan Hills Research Station

Soil type

Wongan loamy sand.

Objective

To compare the effect of cultivation and spraying on doublegee seed longevity.

Trial started

18.6.75.

Results

18.6.75. plant counts and soil samples were taken.
5.3.76. soil samples taken.
30.6.76. plant counts.
6.4.77. soil samples taken.
21.12.77. soil samples taken

		TREATMENT			
		Unsprayed Pasture	Sprayed Pasture	Cultivated Sprayed pasture	LSD 5%
Plants/m^2	1975	126.2	126.2	126.2	
	1976	76	92	109	N.S.
	1977				
Live Seed/m^2	1975	2 640	2 640	2 640	
	1976	3 781	1 885	1 830	1 652
	1977	3 931	1 859	455	1 034
Dead Seed/m^2	1975	1 961	1 961	1 961	
	1976	2 154	1 118	3 661	1 445
	1977	3 262	2 193	3 081	N.S.

Comment

After applying the treatments once, spraying or cultivating pasture reduced the level of live doublegee seed in the soil. After applying the treatment in two successive years, no further reduction in live seed has occurred on the sprayed pasture, but cultivation has continued to significantly reduce the live seed population

DOUBLEGEE SEED LONGEVITY X DEPTH

76C9

Locality

Chapman Research Station.

Source of Seed - Chapman 1975.

Trial Started - 14.7.76. Doublegee achenes enclosed in gauze were buried at 12, 25, 50 and 100 mm. 50 achenes per plot.

Results - July 1976: Germination test on seed used at start of experiment.

Nov. 1976 - Seed recovered for germination test.

Nov. 1977 - Seed recovered for germination test.

Length of time buried (mths.)	Depth of Burial mm	No. of Seeds recovered	% live seed	% dead/ empty seed
Nil (stored in Lab) July 1976	-	-	88	12
Four months (one winter) Nov. 1976	12	200	66.5	33.5
	25	200	69.0	31.0
	50	200	65.0	35.0
	100	200	70.5	29.5
		mean	67.8	32.2
Sixteen mths. (2 growing seasons) Nov. 77.	12	204	49.0	51.0
	25	200	54.5	45.5
	50	200	51.0	49.0
	100	200	46.0	54.0
		mean	50.1	49.9

Comment: Half of the seed is still viable after being buried for 16 months. The viability of the seed has not been affected by the depth at which it was buried during this time. This result is different from the situation at Wongan Hills (75WH66) where the viability of buried doublegee seeds has declined rapidly in the first nine months of the trial.

GUILDFORD GRASS CONTROL

76AL11

Locality T.W. & S.M. Ferguson, Narrikup.

Spraying dates - 25.5.76.
12.7.77.

Method - 1976 Treats 8 & 9 sown to oats 28.5.76.
Treats 9 resown to oats 5.10.76.
Soil sampled December 1976.

Method - 1977 Treats 4 & 5 rotary hoed 26.4.77.
Treats 8 & 9 sown to oats 12.7.77.
Treat. 5 cultivated 21.7.77.
Treat 9. resown to oats 5.10.77.
Soil sampled December 1977.

Results Guildford grass bulbs were received from the soil samples, combed and weighed.

TREATMENT	BULBS/M^2	
	1976	1977
1. Unsprayed control	14 596	8 925
2. 22 DPA 3kg/ha. and repeat	10 389	8 268
3. " " 6kg/ha. and repeat	8 018	8 553
4. Gramaxone 700mls. + cultv. & spray	7 019	7 895
5. " 700mls. + cultv. & spray & cultvn.	7 019	2 697
6. " 1.4 l. + cultvn. & spray	8 576	5 417
2,4-D amine & repeat	8 623	8 268
8. Cultvn. + oats & repeat	1 976	811
9. (Cultvn. & oats) x 2 and repeat	1 139	1 469
LSD 5%		1 971

Comment

None of the herbicides have selectively controlled Guildford grass in pasture.

All treatments that included winter cultivation have reduced bulb numbers, but not sufficiently to prevent a re-establishment.

Cereals do not grow well on the soil of the trial site, so there is a need to find a suitable crop before further studies on the effect of cultivation on Guildford grass are continued.

CROP YIELD LOSS DUE TO DOUBLEGEE

77C3

Locality - Chapman Research Station

Method

Doublegees were planted at various densities with Madden wheat in $4m^2$ plots on 14.6.77.

Doublegee establishment under the crop was measured by counting seedlings on 4.7.77 and 26.7.77.

One square metre was hand harvested from the weedy and an adjoining weed free plot at the end of the growing season.

This method was carried out on a heavy and a light land site.

Results

a) Heavy land -

		SE Mean
Range of weed densities 4/7	1-389 plants/m^2	
Mean grain yield/weedy plots	1.060 tonnes/ha	0.07
" " " /weed free plots	1.376 tonnes/ha	0.05
Mean % yield loss	22.57%	5%

Linear relationships:

1st count vs gms grain/m^2	$y_1 = 122.9 - 0.19x$	$r = 0.673xx$
2nd " " " " "	$y_1 = 125.8 - 0.23x$	$r = 0.689xxx$
1st count vs % yield loss	$y = 8.4 + 0.16x$	$r = 0.828xxx$
2nd " " " " "	$y = 6.0 + 0.19x$	$r = 0.848xxx$

b) Light land -

Range of weed diversities 4/7	0-244 plants/m^2	
Mean grain yield of weedy plots	1.31 tonnes/ha	0.11
" " " " weedful "	1.92 tonnes/ha	0.07
Mean % yield loss	31.6	4.9

Linear relationships:

1st count vs gms grain/m^2	$y_1 = 165.8 - 0.52x$	$r = 0.796xxx$
2nd " " " " "	$y_1 = 169.1 - 0.53x$	$r = 0.824xxx$
1st count vs % yield loss	$y = 16.1 + 0.23x$	$r = 0.769xxx$
2nd " " " " "	$y = 15.5 + 0.23x$	$r = 0.757xxx$

x = doublegee plants/m^2 $\quad$ y_1 = gms/m^2

Comment

Grain yield has been as good a measure of the effect of doublegee on the crop, as percent yield loss. There was not much difference between the first and second time of counting weeds in this study.

The higher yielding crop on the light land appears to have been more sensitive to weeds than the heavy land, although further analysis is required to establish whether the difference in slopes between heavy and light land data is significant.

Doublegee was less severe on wheat yield in 1977 than when measured at Chapman in 1976 when the weed free yield was lower (1.14 tonne/ha).

CROP YIELD LOSS DUE TO DOUBLEGEE

77GE9

Locality - D. Morrel, Geraldton

Method

Doublegees were planted at various densities with wheat in $4m^2$ plots on 2.6.77.

Doublegee establishment under the crop was measured by counting seedlings on 29.6.77 and 27.7.77.

One square metre was hand harvested from the weedy plot and an adjoining weed free plot at the end of the growing season.

Results

		SE Mean
Range of weed densities	0 - 84 plants/m^2	
Mean grain yield weedy plots	3.11 tonnes/ha	0.01
" " " weedfree plots	3.34 " "	0.03
Mean % yield loss	6.25%	3.8

Linear relationships:

1st count vs gms grain/m^2	$y = 345.4 - 0.93x$	$r = 0.566^*$
2nd " " " " "	$y = 345.0 - 0.98x$	$r = 0.526^*$
Plant counts vs % yield	- not significantly related	

y = gms/m^2

Comment

Capeweed had grown on some plots by harvest and some plots were difficult to harvest due to lodging. However a significant correlation (P 0.05) between doublegee density and grain yield was obtained although percent yield loss did not relate significantly to doublegee density.

CROP YIELD LOSS DUE TO DOUBLEGEE

77ME28, 77N034, 77M028

Localities - Merredin, Northam, Moora

Method

Doublegees were planted at various densities with wheat in $4m^2$ plots. Doublegee establishment under the crop was measured by counting seedlings.

One square metre was hand harvested from the weedy plot and an adjoining weed free plot at the end of the growing season. Sites were placed on potential heavy and light yielding situations.

Results

	Range of weed Densities	Mean grain yield tonnes/ha		Mean % yield loss
		weedy plots	weedfree plots	
Merredin heavy	0 - 68	0.786	0.756	-13.5
light	0 - 63	0.755	0.861	9.1
Northam heavy	0 - 12	2.96	2.41	2.86
light	0 - 40	2.28	2.27	5.81
Moora heavy	0 - 80	1.343	1.463	7.2
light	0 - 32	2.539	2.577	0.76

Comment

Doublegee density did not correlate significantly with either grain yield or percent loss of yield in any of these trials.

Yields were low at Merredin, doublegee establishment was poor at Northam and seasonal conditions at Moora were similar to Merredin except good finishing rains at Moora resulted in good final yields.

YIELD LOSS DUE TO DOUBLEGEE - TIME OF SEEDING

77WH33

Location - Wongan Hills Research Station

Method

Doublegees were planted at various densities with wheat in mid June and mid July. Doublegee establishment was measured by counting seedlings 4 - 6 weeks after seeding and by assessing dry weight of the weed and crop at this time.

At the end of the growing season the plots plus an adjoining weed free plot were harvested.

Results

a) Early sown 16.6.77

Range of weed densities	0 - 8 plants/m^2	
Mean grain yield weedy plot	1.947 tonne/ha	
" " " weedfree plots	1.849 " "	
Mean % yield loss	-5.9%	N.S.

b) Late sown 14.7.77

Range of weed densities	0 - 52 plants/m^2
Mean grain yield weedy plot	1.179 tonnes/ha
" " " weedfree plots	1.190 " "
Mean % yield loss	0.03%

Comments

Doublegees did not establish in sufficient numbers to reduce yields of the early sown crop, but significant linear relationships occurred between the weed and the late sown crop. They were -

1)	Dry Wt Weed/Dry Wt Crop vs grain yield	$y = 1.25 - 1.51x$ x = DWW/DWC y = tonnes/ha	$r = 0.507^{*}$
2)	Plant count vs grain yield	$y = 1.28 - 0.007x$ x = plants/m^2 y = tonnes/ha	$r = 0.736^{***}$
3)	DWW/DWC vs % yield loss	$y = -5.9 + 124.9x$ x = DWW/DWC y = % yield loss	$r = 0.496^{*}$
4)	Plant count vs % yield loss	$y = -6.8 + 0.46x$ x = plants/m^2 y = % yield loss	$r = 0.575^{*}$

Dry early seasonal conditions have probably been responsible for the fact that the sown weeds did not establish and reduce yields of the early sown crop. These results cannot be taken to mean weeds are more severe on late sown crops, when time of seeding experiments conducted over many years have generally shown that

weeds are more severe on crop yield when the crop is sown too early.

However, these results support data from similar studies in 1977 which showed that doublegee seedling counts can correlate with grain yield as closely as with percent yield loss and so the experimental technique for further work could be modified.

DOUBLEGEE CONTROL IN PASTURE

Location - Chapman Research Station, Geraldton, Three Springs.

Pasture - Geraldton sub clover or sub clover mixtures.

Spraying Times

Chapman	27.5.77	doublegees - 4 leaves
Geraldton	16.6.77	doublegees fairly advanced
Three Springs	27.5.77	doublegees - 3 leaves

Results

Treatment	Visual Ratings		
	Chapman	Geraldton	Three Springs
Unsprayed control	0	0	0
Tribunil 500 g/ha	2	0	2
" 850 "	3	2	2
" 1000 "	5	2	2
2,4-DB 1.5 l/ha	5	3	4
" 3.0 l/ha	5	3	4

Visual rating 5 = 98-100% control
3 = less than 75% control

Comment

1.5 litre 2,4-DB/ha has been the most satisfactory treatment at all sites although doublegee control at the Geraldton and Three Springs sites was poor.

850 gm Tribunil/ha and 1.5 litre 2,4-DB/ha have been the most consistent treatments to give good selective doublegee control in the northern wheatbelt over the four years that these trials have been conducted.

500 gm Tribunil and 1.5 litre 2,4-DB/ha have given good selective control over the same period at Avondale Research Station and the lower rate of Tribunil could be expected to be satisfactory for the Avon Valley area and all districts south to Albany.

TIME OF SPRAYING BROADLEAF WEEDS IN WHEAT

77LC26

Locality - K. Strevett, Beenong

Results

	Treatment		Mean yield kg/ha
1.	Unsprayed	Crop	995.3
2.	Tribunil D	850 g/ha - 3 leaf	1305.2
3.	Buckshot	1 l/ha - 3 leaf	1126.8
4.	2,4-D ester	500 ml/ha - early tillering	1136.2
5.	Buckshot	1 l/ha - early tillering	1145.5
6.	2,4-D ester	500 ml/ha - fully tillered	948.4
7.	MCPA	1 l/ha - fully tillered	1136.2

Mean weed population on the unsprayed plots: $463/m^2$ - mainly mustard.

Comments

Tribunil D was the only treatment significantly better than the control. At this site it was profitable to spray Tribunil D on to a weed population of 463 plants/m^2.

DOUBLEGEE CONTROL IN PASTURE - AN EVALUATION WITH SHEEP

7606

Location - Chapman Research Station

Objective

To study the effect of spraying a doublegee infested pasture on the incidence of foot injury and on meat and wool production of ewes and lambs.

Results

	Mean doublegees/m^2 27.7.77	Mean burrs/m^2 7.11.77	Mean Burrs /foot 7.11.77		Mean Carcass Value 7.11.77
			ewes	lambs	lambs
Nil spray	154	2774	3.4	5.4	$7.32
Tribunil 500 g/h	32	1554	2.1	2.4	$9.39
" 1000 g/h	7	373	1.2	1.7	$8.37

Comments

The value of the lamb carcasses was significantly increased by spraying the doublegee infested pasture with 500 g Tribunil/ha. Had the stocking rate been higher then the mean carcass value for the 1000 g Tribunil treatment would probably have been higher, but these paddocks became very grassy and the lamb carcasses were given low grades.